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10 CFR 50.73

September 5, 2006

SVPLTR # 06-0046

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Dresden Nuclear Power Station, Unit No. 2
Renewed Facility Operating License No. DRP-19
NRC Docket No. 50-237

Subject: Licensee Event Report 237/2006-004-00, "Unit 2 Reactor Scram due to Main Steam Isolation Valve Closure"

Enclosed is Licensee Event Report 237/2006-004-00, "Unit 2 Reactor Scram due to Main Steam Isolation Valve Closure," for Dresden Nuclear Power Station, Unit 2. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)."

Should you have any questions concerning this report, please contact Mr. James Ellis, Regulatory Assurance Manager, at (815) 416-2800.

Respectfully,

David B. Wozniak for/

Danny G. Bost
Site Vice President
Dresden Nuclear Power Station

Enclosure

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Dresden Nuclear Power Station

IE22

NRC FORM 366 (6-2004) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 06/30/2007

Estimated burden per response to comply with this mandatory collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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4. TITLE
Unit 2 Reactor Scram due to Main Steam Isolation Valve Closure

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	N/A
07	04	2006	2006	- 004 -	00	09	05	2006	FACILITY NAME: N/A	DOCKET NUMBER: N/A

9. OPERATING MODE
1

10. POWER LEVEL
098

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR§: *(Check all that apply)*

☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(i)(C)	☐ 50.73(a)(2)(vii)
☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(C)	☐ OTHER
☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(v)(D)	Specify in Abstract below or in NRC Form 366A

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Dresden Nuclear Power Station – George Papanic Jr.	(815) 416-2815

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
NA					NA				

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

On July 4, 2006, at approximately 0259 hours (CDT), with Unit 2 at approximately 98 percent power, Dresden Nuclear Power Station Unit 2 received a Group I Isolation on a Main Steam Line High Flow signal. The Main Steam Line High Flow signal was caused by the unexpected closure of the 1A Main Steam Isolation Valve and the resulting redistribution of steam to the remaining three main steam lines. All Group I isolation valves closed and the reactor automatically scrammed. Reactor water level was automatically controlled and the reactor vessel level shrink resulted in an expected Group II and Group III isolation signals. All systems responded as required and the Isolation Condenser was manually initiated to control reactor pressure. This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)."

The root cause of the event was attributed to two potential failure modes, inadequate tightening of the compression fitting nut causing inadequate compression of the ferrule to the tubing to the 1A Main Steam Isolation Valve, or the existing tubing to the 1A Main Steam Isolation Valve is undersized. Corrective actions include replacement of the compression fitting to the 1A Main Steam Isolation Valve, implementation of corrective actions as required to address any knowledge weaknesses relating to proper compression fitting assembly and verification practices as determined through the appropriate training systems analysis, and to inspect the compression fittings and tubing associated with Unit 2 and Unit 3 Main Steam Isolation Valves.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

Dresden Nuclear Power Station (DNPS) Unit 2 is a General Electric Company Boiling Water Reactor with a licensed maximum power level of 2957 megawatts thermal. The Energy Industry Identification System codes used in the text are identified as [XX].

A. Plant Conditions Prior to Event:

Unit: 02 Event Date: 07-4-2006
Reactor Mode: 1 Mode Name: Power Operation Power Level: 98 percent
Reactor Coolant System Pressure: 1000 psig

B. Description of Event:

On July 4, 2006, at approximately 0259 hours (CDT), with Unit 2 at approximately 98 percent power, DNPS received a Group I Isolation on a Main Steam Line High Flow signal. The Main Steam Line High Flow signal was caused by the unexpected closure of the 1A Main Steam Isolation Valve (MSIV) [V] and the resulting redistribution of steam to the remaining three main steam lines. All Group I isolation valves closed and the reactor automatically scrammed. All control rods inserted. Reactor water level was automatically controlled and the reactor vessel level shrink resulted in an expected Group II and Group III isolation signals. All systems responded as required and the Isolation Condenser was manually initiated to control reactor pressure.

An Emergency Notification System (ENS) call was made on July 4, 2006, at 0421 hours (CDT) for the above-described event. The assigned ENS event number was 42685.

This event is being reported in accordance with 10 CFR 50.73(a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)." A reactor scram, multiple MSIV closures and general containment isolation signals affecting containment isolation valves in more than one system are listed in 10 CFR 50.73(a)(2)(iv)(B).

C. Cause of Event:

The root cause of the event was attributed to two potential failure modes, (1) inadequate tightening of the Crawford-Swagelok compression fitting nut causing inadequate compression of the ferrule to the tubing to the 1A MSIV, or (2) the existing tubing to the 1A MSIV is undersized for the compression fitting used. These causes are classified as human performance.

On July 4, 2006, at approximately 1730 hours (CDT), a team of DNPS personnel entered the Unit 2 Drywell and discovered the tubing to the 1A MSIV Solenoid Manifold Pilot Block had pulled out of the tube compression fitting at the Pilot Block. This failure resulted in the loss of the pneumatic pressure causing the 1A MSIV to close and eventually resulted in the reactor scram. A visual inspection of the fitting and tube conducted in the Drywell could not conclusively identify the cause of the failure. An end section of the tubing was cut off and the existing compression fitting was removed for further inspection. A new compression fitting was installed on the 1A MSIV. The new 1A MSIV compression fitting and the existing connections on the seven other inboard and outboard MSIVs Solenoid

Manifold Pilot Blocks were leak checked to verify no leaks. The 1A MSIV was stroke tested after repairing the tubing. Unit 2 was returned to service.

Subsequently, it was discovered that the cut off section of tubing from the 1A MSIV was lost during the decontamination and demobilization of the Drywell work and only the existing compression fitting was available for further investigation into the cause of the failure. DNPS's investigation of the compression fitting identified that a Parker designed ferrule was used in a Crawford-Swagelok fitting body. Although at DNPS the use of a Crawford-Swagelok fitting body with a Parker designed ferrule is not recommended, a 1995 engineering evaluation concluded that in this application, Parker compression fitting ferrules are interchangeable with Crawford-Swagelok compression fitting parts.

An inspection of the Parker ferrule identified the tip of the leading edge had an inside diameter of 0.212 inches. The nominal outside diameter of 1/4 inch tubing is 0.250 and the nominal outside diameter of 3/16 inch tubing is 0.187 inches. Additionally, the ferrule had a lack of axial scoring and galling of its inside surface which indicates a low mechanical gripping force between the inside surface of the ferrule and the tubing. The low mechanical gripping force between the inside surface of the ferrule and the outside surface of the tubing allowed the tubing to pull out of the compression fitting ferrule. Without the cut off section of tubing from the 1A MSIV, DNPS was unable to determine the exact cause of the failure.

Additional outside laboratory failure analysis testing was performed that used different combinations of Crawford-Swagelok compression fitting components with Parker compression fitting components on 1/4 inch and 3/16 inch tubing. The results of the testing combined with the observations from the Drywell personnel that worked on the existing 1A MSIV compression fitting eliminated the possible failure modes of joint cleanliness, improper compression fitting material, improper compression fitting internal dimensions, damaged tubing, galling of the compression fitting nut/body threads, improper orientation of the ferrule, fatigue/overload fracture, missing compression fitting parts and inadequate insertion of the tube into the compression fitting. The testing could not eliminate the possible failure modes of, (1) inadequate tightening of the Crawford-Swagelok compression fitting nut causing inadequate compression of the ferrule to the tubing, or (2) the existing tubing to the 1A MSIV is undersized (i.e., 3/16 inch tubing instead of 1/4 inch tubing). A historical review of the work history associated with the 1A MSIV indicates that the last time the compression fitting was disturbed was in an October 2003 refueling outage. It is unknown when the last time the compression fitting was assembled with the as-found ferrule.

D. Safety Analysis:

The safety significance of the event is minimal. All control rods inserted as a result of the scram and all systems responded as required. The inadvertent closure of a MSIV is an analyzed transient in the DNPS Updated Final Safety Analyses Report in Section 15.2.4 and is classified as a moderate frequency event. Therefore, the consequences of this event had minimal impact on the health and safety of the public and reactor safety.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

E. Corrective Actions:

The new 1A MSIV compression fitting and the existing connections on the seven other inboard and outboard MSIVs Solenoid Manifold Pilot Blocks were leak checked to verify no leaks.

Laboratory failure analysis testing was performed that used different combinations of Crawford-Swagelok compression fitting components with Parker compression fitting components on 1/4 inch and 3/16 inch tubing to provide data for the evaluation of the possible cause of the 1A MSIV compression fitting event.

Corrective actions will be implemented as required to address any knowledge weaknesses relating to proper compression fitting assembly and verification practices as determined through the appropriate training systems analysis.

Unit 2 and Unit 3 MSIV tubing and compression fittings will be inspected to confirm correct tubing size, fitting components and compression of the ferrule.

DNPS's MSIV Model Work Orders will be updated to include "Tube Fitting Repair and Replacement Instructions," and include the instructions in work orders where compression fitting are identified. Additionally, the "Tube Fitting Repair and Replacement Instructions," will be revised to include removing the compression fitting nut to check for proper ferrule location and compression.

F. Previous Occurrences:

A review of DNPS Licensee Event Reports (LERs) for the last three years did not identified any LERs associated with, inadequate tightening of the compression fittings, or under sized tubing.

G. Component Failure Data:

NA